DOCUMENT RESUME

ED 260 095 TM 850 412

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TITLE Analysis of Multiple Contingency Tables by Exact Conditional Tests for Zero Partial Association.
INSTITUTION Danish Inst. for Educational Research, Copenhagen.
REPORT NO DPI-1984-01; ISBN-87-7416-213-6
PUB DATE 84
NOTE 33p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Correlation; Elementary School Teachers; *Expectancy Tables; Foreign Countries; Graphs; *Hypothesis Testing; *Mathematical Models; Multivariate Analysis; Primary Education; Probability; *Statistical Significance; Statistical Studies; Teacher Burnout
IDENTIFIERS Conditional Independence; Denmark; Exact Conditional Tests; Log Linear Models; *Multiple Contingency Tables; *Zero Partial Association

ABSTRACT

The tests for zero partial association in a multiple contingency table have gained new importance with the introduction of graphical models. It is shown how these may be performed as exact conditional tests, using as test criteria either the ordinary likelihood ratio, the standard x squared statistic, or any other appropriate statistics. A strategy is presented for model selection, based exclusively on exact tests for zero partial association, performed initially in the full table and subsequently in appropriate marginal tables. This strategy is applied to a survey on stress in Danish primary school teachers. It illustrates that the usual asymptotic p-values are completely unreliable for large sparse tables. The appendix contains a computer printout of the complete seven-dimensional table analyzed in the article, plus all two-dimensional marginal tables. (Author/GDC)

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# Analysis of Multiple Contingency Tables by Exact Conditional Tests for Zero Partial Association

Svend Kreiner

U.S. DEPARTMENT OF EDUCATION
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Tryk: DPI off-set
Sats: RECKU
DPI nr. 1984.01
ISBN nr. 87 7416 213 6

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# Analysis of multiple contingency tables by exact conditional tests for zero partial association

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## Summary

The tests for zero partial association in a multiple contingency table (suggested by Birch (1965) and later used by Wermuth (1976) for a more elaborate model-searching strategy) have gained new importance with the Introduction of the class of graphical models. It is shown how these may be performed as exact conditional tests using as test criteria either the ordinary likelihood ratio, the standard $\chi^2$ statistic or any other appropriate statistics (e.g. statistics incorporating on ordinal properties of some of the categorical variables.

A strategy for model selection based exclusively on exact tests for zero partial association, performed initially in the full table and subsequently in appropriate marginal tables, is presented.

An example of application of the strategy is given, which illustrates that the usual asymptotic p-values are completely unreliable for large sparse tables.

Some key words: Conditional independence; Contingency table; Exact conditional test; Graphical model; Log linear model; Model selection strategy; Sparse tables; Zero partial association.

## 1. Introduction

This article considers the possibilities of performing exact (or approximate) conditional tests of certain hypothesis encountered in connection with the analysis of multiple contingency tables.

Throughout the paper, the basic concepts and results for the log linear and graphical models for contingency tables will be assumed known (Bishop, Fienberg and Holland (1975) and Lauritzen (1982) provide good introductions to the subject while Edwards and Kreiner (1983) discuss several strategies appropriate for the analysis of contingency tables by graphical models).

We will use the same notation as Edwards and Kreiner (1983). The same graphical model may thus be specified in three different ways:

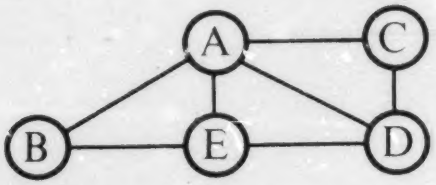
1) By the generating sets or alternatively the minimal sufficient marginals of the models:

   [ABE][ADE][ACD]

2) By statements concerning independence between pairs of variables given the rest of the variables forming the table:

   $\{B \perp C \mid ADE\} \cap \{B \perp D \mid ACE\} \cap \{E \perp C \mid ABD\}$

3) By the interaction-graph.




## 2. Graphical models

An important property of the class of graphical models for multiple contingency tables introduced by Darroch, Lauritzen and Speed (1980) (DLS) is that they only presuppose the fundamental statistical concept of conditional independence.

The graphical models may in fact be characterized as the class of models defined by assumptions concerning conditional independence of pairs of variables given the values of the remaining variables, without any further assumptions concerning a simpler (reduced) parametric specification of the probabilities.

It is shown in DLS that it is indeed possible to construct a statistical model from the conditional independence properties alone and that the class of graphical models is a subclass of the general class of hierarchical log linear models. It also follows from DLS, that any non-graphical log linear model may be regarded as a submodel of a minimal graphical model with some of the higher order interactions vanishing, that is as a model with the same conditional independence properties as the graphical model, but with a simpler parametric structure. In this sense the graphical models may be regarded as the class of non-parametric models for contingency tables, while the non-graphical log linear models constitute a class of parametric contingency table models.

The interaction graph with vertices representing variables and missing edges representing conditional independencies is a powerful analytical and and practical tool.

It should be emphasised, that the interaction graphs is more than a mere visualization of the statistical model. The interaction graph is in itself a mathematical model. It may be analysed using standard graph-theoretical results and several of the important graph-theoretical concepts may be interpreted in terms of the statistical model. The interaction graph thus facilitates a quick insight in the properties of the statistical model under consideration and may thus be used both for the planning and execution of the statistical analysis and for the interpretation of the results.

The two most important results are:

1) That the generating sets or the minimally sufficient marginals are represented by the cliques interaction graph.

2) That decomposability fully (in the case of a triangulated interaction graph) or partially corresponds to decomposability of the statistical model (Sundberg (1975)).

Both the theoretical and practical consequences of choosing the smaller class of graphical models as the basis of the statistical analysis are discussed in futher detail in Edwards and Kreiner (1983).

## 3. Birch's test for zero partial association

It is an immediate consequence of definition of graphical models as models specified by the conditional independencies, that the problem of finding the "best" graphical model for a given contingency table may be reduced to relatively few questions even when the number of possible graphical models is quite large.

Disregarding the models where one or more variables are irrelevant the total number of graphical models for a 7-dimensional contingency tables is $2^{21} = 2097152$. The model may be found however by testing at most 21 hypotheses of conditional independence for pairs of variables (or at least for each pair, for which the hypotheses are relevant) given the rest of the variables forming the contingency table.

These hypotheses correspond to the hypotheses of zero partial association (ZPA) discussed by Birch (1965) and later used by Wermuth (1976) for a more elaborate model-searching strategy. The analysis of contingency tables by graphical models may thus be seen to place more emphasis on Birch's test than is usually found in literature on the analysis of contingency tables.

It will be demonstrated in the example that a quite satisfactory analysis may be performed using Birch's test exclusively, either in the full contingency table or (in connection with a stepwise procedure) in certain collapsed tables.

The six ZPA-hypotheses which may be tested in a 4-dimensional contingency table are shown table 1.

Table 1. The hypotheses of conditional independency for a four-way table formed by four categorical variables A,B,C and D.

| | Hypothesis | Generating sets |
|---|---|---|
| I | $\{A \perp B \mid CD\}$ | [ACD][BCD] |
| II | $\{A \perp C \mid BD\}$ | [ABD][BCD] |
| III | $\{A \perp D \mid BC\}$ | [ABC][BCD] |
| IV | $\{B \perp C \mid AD\}$ | [ABD][ACD] |
| V | $\{B \perp D \mid AC\}$ | [ABC][ACD] |
| VI | $\{C \perp D \mid AB\}$ | [ABC][ABD] |

A convenient aspect of testing ZPA-hypotheses in contingency tables of dimensions greater than three is the fact that the condintioning variables may be combined into one categorical variable. The variables C and D may thus be combined into one variable $X = C * D$ for the test of the first hypothesis in table 1. Whatever the dimension of the original contingency table, the tests of ZPA-hypotheses may thus always be treated as tests in a 3-dimensional table.

Consider then a 3-dimensional contingency table formed by variables A,B and X and the ZPA-hypothesis, $A \perp B \mid X$.

The generating sets for the model under the hypothesis are [AX] [BX] with the AX- and BX-marginals as sufficient statistics. It follows from principles of conditional inference that the hypothesis should be evaluated with respect to the conditional distribution of the contingency table given these marginals.

The 3-dimensional table may be viewed as consisting of several

"slices" of 2-dimensional AB-tables, one for each level of the conditioning X-variable, and the conditioning with respect to the AX- and BX-marginals may easily be seen to correspond to conditioning with respect to the marginals in each of the 2-dimensional slices. The conditional probability of the 3-dimensional table given the 2-dimensional AX- and BX-marginals may therefore be expressed as the product of the conditional probabilities for each "slice" given the corresponding 1-dimensional marginals, i.e. a product of generalized hypergeometric probabilities.

The conditional test may be performed according to the following algorithm:

A. Generate all tables with the given AX- and BX-marginals.

B. Calculate the appropriate test statistic for each table.

C. Calculate the conditional probability of each table.

D. Calculate the attained level of significance (p-value) as the sum of the conditional probabilities for the tables which are at least as favorable to the alternative hypothesis (according to the test statistic) as the observed table.

Note that the conditional approach makes it possible to use test statistics for which no asymptotic results are available, for example tests using ordinal properties of the variables.

When the number of tables to be generated is too large to be economically implemented the following procedure can be used.

A. Generate a random sample of tables according to the conditional distribution of the table given the sufficient marginals. The tables may in the case of the ZPA-hypothesis be generated one slice at time because of the factorization property mentioned above. Each slice may be generated using either the method of Agresti et. al. (1979) and Boyett (1979) or the faster (in the case of moderate or large samples) method of Patefield (1981). The latter method is based on a factorization of the generalized hypergeometric distribution for rxc tables into a product of ordinary hypergeometric probabilities for 2x2 tables. (This leads to a "one cell at a time" -generation or the cells of the slices).

B. For each generated table the appropriate test statictics are calculated.

C. The attained level of significance is approximated as the number of generated tables which are at least as favorable to the alternative as the observed table divided by total number of tables generated.

## 4. An examble

We illustrate the conditional test with an example of data from a survey research on teachers in the Danish primary school. The data were collected in 1978 and comprised several different variables from which the following seven were choosen for the present example:

A. **Stress** categorized as low, medium or high degree of stress.

B. **Number of periods absent from work because of sickness** categorized into no periods, 1-3 periods and more than 3 periods.

C. **The degree to which the works seems overwhelming** categorized into four categories: low degree, general high degree , high degree specifically in relation to the educational tasks of the teacher and high degree specifically in relation to the social work of the teacher.

D. **The degree to which the teacher found the work divided between too many classes, too many subjects and/or too many shifts between classes pr. day** (low, medium or high degree of scatteredness).

E. **Number of experienced problems.** (few, medium, many).

F. **Urbanisation** classified according to four ordinal categories from low to high degree.

G. **Sex.**

A total of 2748 teachers were classified in the contingency table formed by the seven variables. The table containing 2592 cells is far too large to print in this format but will be published later in a research report from the Danish Institute for Educational Research. Although we have more than one teacher per cell we have a typical example of a large sparse table as the teachers are non-uniformly distributed with respect to all variables.

F and G will be considered explanatory variables and the other response variables. For this reason the FG interaction will be included in all models considered in this analysis.

We notice also that all variables except sex (G) and overwhelmingness (C) are ordinal.

The analysis were performed acording to the follow simple strategy:
The first step consisted of tests of conditional independence of each pair of factors given the other variables followed by construction of the interaction graph for the graphical model defined by the conditional independencies accepted by these tests.
The test statistics used for this analysis were the likelihood ratio test, the standard $\chi^2$ test and - in the case of two ordinal or binary variables - a partial $\gamma$- coefficient summarizing the values of the Goodman - Kruskall $\gamma$'s calculated for each slice of the three - dimensional table defined after stacking of the conditioning factors.
Exact conditional p-values (one sided in the case of the partial $\gamma$'s) were approximated from random samples of 500 tables generated according to the above mentioned algorithm and the hypotheses accepted if all the corresponding p-values were greather than 1 %.
Included also in Table 2 are the asymptotic p-values for the likelihood ratio and $\chi^2$ tests corresponding to the numbers of degrees of freedom adjusted for empty estimated cells according to the procedure suggested by Bishop, Fienberg & Holland (1975), page 115-116.

The results are shown in Table 2 and Figure 1.

The hypotheses of conditional independence were rejected in 10 of the 21 cases leading to the graphical model shown in Figure 1 and with the generating sets (readily read of the interaction graph): [ABE] [ACE] [BDE] [BEF] [BFG].

Of further interest in table 2 the marked discrepancy not only between the exact and asymptotic p-values, but also between the asymptotic p-values of the likelihood ratio and the $\chi^2$ test should be noted.

While the analysis in principle might stop with the construction of the interaction graph shown in figure 1 the tests used may be presumed to have relatively low power thus leading to the acceptance of too many hypotheses.

If for no other reason this warrants a more extensive analysis of the data.

This second step of the analysis consists of

a) Derivation of results concerning conditional independence in marginal tables given the base model generated by the first step of the analysis.

b) Treating these properties as hypotheses, the base model may be validated by the corresponding tests of conditional independence in marginal tables, using the same methods as in the first step of the analysis.

Table 2. Conditional tests of all zero partial association hypotheses for the contingency table classifying teachers according to stress (A), absence (B), overwhelmingness (C), scatteredness (D), Problems (E), Urbanisation (F) and sex (G).

$P_e$ = exact conditional p-value.

$P_a$ = asymptotic p-value.

| hypothesis | degrees of freedom | LR | p-values $P_e$* | $P_a$ | $\chi^2$ | p-values $P_e$ | $P_a$ | $\gamma$ | $P_e$ | comments A** k*** |
|---|---|---|---|---|---|---|---|---|---|---|
| A ⊥ B\|CDEFG | 258 | 346.1 | 0.000 | 0.000 | 350.0 | [illegible] | 0.000 | 0.396 | 0.000 | R |
| A ⊥ C\|BDEFG | 251 | 345.5 | 0.004 | 0.000 | 349.9 | [illegible] | 0.000 | - | - | R |
| A ⊥ D\|BCEFG | 221 | 269.7 | 0.314 | 0.014 | 255.4 | [illegible] | 0.056 | 0.075 | 0.162 | *A* |
| A ⊥ E\|BCDFG | 243 | 289.8 | 0.506 | 0.021 | 286.2 | 0.222 | 0.030 | 0.277 | 0.000 | R |
| A ⊥ F\|BCDEG | 299 | 333.2 | 0.504 | 0.094 | 353.5 | 0.136 | 0.017 | 0.061 | 0.110 | *A* |
| A ⊥ G\|BCDEF | 140 | 190.1 | 0.614 | 0.003 | 158.2 | 0.469 | 0.139 | 0.169 | 0.012 | *A* |
| B ⊥ C\|ADEFG | 272 | 342.7 | 0.442 | 0.002 | 290.5 | 0.540 | 0.210 | - | - | *A* |
| B ⊥ D\|ACEFG | 223 | 320.4 | 0.102 | 0.000 | 277.2 | 0.104 | 0.008 | 0.209 | 0.000 | R |
| B ⊥ E\|ACDFG | 246 | 335.8 | 0.184 | 0.000 | 309.1 | 0.078 | 0.004 | 0.170 | 0.000 | R |
| B ⊥ F\|ACDEG | 320 | 440.9 | 0.046 | 0.000 | 432.4 | 0.004 | 0.000 | 0.153 | 0.000 | R |
| B ⊥ C\|ACDEF | 165 | 268.4 | 0.042 | 0.000 | 228.1 | 0.018 | 0.001 | 0.276 | 0.000 | R |
| C ⊥ D\|ABEFG | 260 | 325.1 | 0.374 | 0.004 | 299.6 | 0.318 | 0.045 | - | - | *A* |
| C ⊥ E\|ABDFG | 284 | 396.6 | 0.004 | 0.000 | 367.3 | 0.060 | 0.001 | - | - | R |
| C ⊥ F\|ABDEG | 369 | 421.6 | 0.660 | 0.030 | 403.2 | 0.538 | 0.107 | - | - | *A* |
| C ⊥ G\|ABDEF | 178 | 224.9 | 0.997 | 0.010 | 178.1 | 0.990 | 0.483 | - | - | *A* |
| D ⊥ E\|ABCFG | 241 | 402.2 | 0.000 | 0.000 | 368.3 | 0.000 | 0.000 | 0.341 | 0.000 | R |
| D ⊥ F\|ABDEG | 291 | 359.8 | 0.778 | 0.004 | 306.4 | 0.844 | 0.256 | 0.023 | 0.290 | *A* |
| D ⊥ G\|ABCEF | 153 | 208.2 | 0.710 | 0.002 | 171.0 | 0.700 | 0.151 | 0.008 | 0.451 | *A* |
| E ⊥ F\|ACDEG | 321 | 371.4 | 0.730 | 0.028 | 357.5 | 0.428 | 0.078 | 0.115 | 0.000 | R |
| E ⊥ G\|ABEDF | 153 | 187.6 | 0.930 | 0.030 | 157.4 | 0.999 | 0.387 | 0.008 | 0.441 | *A* |

* $P_e$ : Calculated for 500 randomly generated tables.

** A : acceptance

*** R : rejection

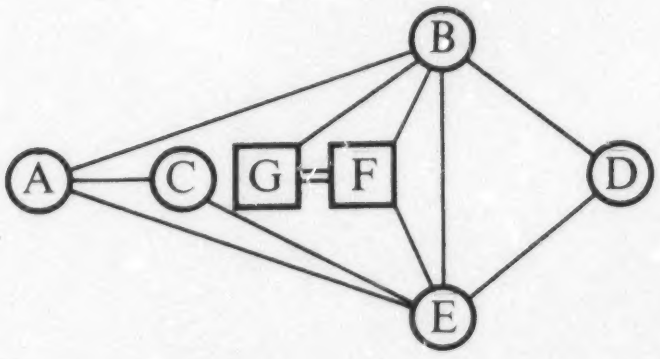



Fig. 1. The interaction graph defined by the conditional independencies accepted in table 2. Response variables are represented by circles, explanatory variables by squares and interactions fixed in the model by double edges.

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It is shown by Edwards & Kreiner (1983) how the marginal conditional independence properties may be inferred directly from the interaction graph.

In the present examples the interaction graph, figure 1, implies the following marginal conditional independencies:

$A \perp D|BE$

$A \perp F|BE$

$A \perp G|BE$ and $A \perp G|BF$

$B \perp C|AE$

$C \perp D|BE$ and $C \perp D|AE$

$C \perp F|BE$ and $C \perp F|AE$

$C \perp G|BF$ , $C \perp G|BF$ and $C \perp G|AE$

$D \perp F|BE$

$D \perp G|BE$ and $D \perp G|BF$

$E \perp G|BF$

Each of the above mentioned relationships corresponds to a marginal table found by collapsing according to three of the orginal seven variables.

Several other conditional independencies in collapsed tables may of course be found, but all will be cases where further collapsing can lead to a marginal table with two conditionally independent variables.

The list of conditional independencies may thus be said to represent the most far-reaching consequences of the conditional independencies given in the base model.

The results of the (marginal) tests of these hypotheses are shown in table 3.

In four of the sixteen cases the hypotheses of marginal conditonal independence were clearly rejected indicating the necessity of including certain interactions in the base model.

Which interaction to include are however not necessarily implied from the results of table 3.

To see this one has to consider the implications of adding only one interaction to the model.

In the present example questions have been raised concerning the conditional independency of variables A and G, variables C and D, variables C and F and variables D and G. It therefore seems natural to consider one or more of these interactions as candidates for inclusion in the model. It won't however be necessary to include all four interactions.

Consider for instance the model with only the interaction between variables C and F included. This model, [ABE] [BDE] [CEF] [ACE] [BFG] [BEF], is shown in Figure 2, from which it is easily seen, that the inclusion of the CF interaction not only remedies the rejected hypothesis of conditional independence between C and F, but also between variables A and G, which should no longer be conditional independent given B and E (but only given B and F) and variables C and D which, given the model shown in Figure 2, are conditional independent given B and E, but not given A and E.

Table 3. Conditional tests of all zero partial associations accepted in the first step of the analysis (table 2). All tests are performed in tables collapsed as a consequence of the first step of the analysis.

| hypothesis | degrees of freedom | LR | p-values $P_c$* | p-values $P_a$ | $\chi_2$ | p-values $P_c$* | p-values $P_a$ | $\gamma$ | p-values $P_c$* | comments A** R*** |
|---|---|---|---|---|---|---|---|---|---|---|
| A⊥D\|BE | 32 | 26.8 | .83 | .73 | 21.7 | .92 | .92 | .112 | .033 | *A* |
| A⊥F\|BE | 54 | 47.2 | .83 | .73 | 47.6 | .71 | .72 | -0.061 | .09 | *A* |
| A⊥G\|BE | 17 | 26.6 | .087 | .064 | 25.5 | .063 | .084 | -0.176 | .000 | R |
| A⊥G\|BF | 24 | 31.1 | .24 | .15 | 29.0 | .22 | .22 | -0.092 | .067 | *A* |
| B⊥C\|AE | 48 | 65.5 | .067 | .047 | 71.3 | .044 | .016 | - | - | *A* |
| C⊥D\|AE | 45 | 76.6 | .003 | .002 | 76.4 | .046 | .002 | - | - | R |
| C⊥D\|BE | 44 | 67.7 | .016 | .012 | 65.1 | .043 | .021 | - | - | *A* |
| C⊥F\|AE | 72 | 108.6 | .003 | .003 | 104.5 | .003 | .007 | - | - | R |
| C⊥G\|BE | 24 | 29.8 | .31 | .19 | 26.1 | .35 | .35 | - | - | *A* |
| C⊥G\|BF | 35 | 48.1 | .16 | .069 | 40.7 | .21 | .23 | - | - | *A* |
| C⊥G\|AE | 24 | 33.1 | .21 | .10 | 28.2 | .23 | .25 | - | - | *A* |
| D⊥F\|BE | 48 | 56.6 | .30 | .18 | 52.7 | .30 | .30 | .018 | .33 | *A* |
| D⊥G\|BE | 16 | 17.2 | .42 | .37 | 16.5 | .40 | .42 | .099 | .011 | *A* |
| D⊥G\|BF | 24 | 39.7 | .026 | .023 | 39.1 | .014 | .027 | .130 | .001 | R |
| E⊥G\|BF | 24 | 41.4 | .023 | .015 | 42.0 | .013 | .013 | .068 | .075 | *A* |

* $P_c$ : Calculated for 700 randomly generated tables.
** A : acceptance
*** R : rejection

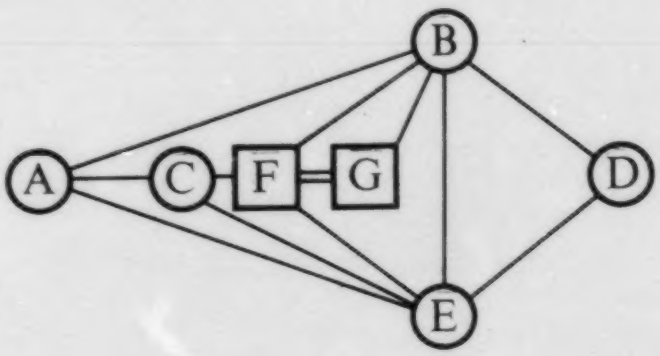


Fig.2. The interaction graph of the model given in figure 1, with the CF interaction included. Response variables are represented by circles, the explanatory variables by squares and interaction fixed in the model by double edges.

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The rejection of hypotheses in the secor d step of the analysis should in fact be interpreted as evidence against the model as a whole and not necessarily as evidence against hypotheses concerning specific interactions.

This point is further stressed by the fact, that in all four cases, where the hypotheses of conditional independence in marginal tables were rejected, the hypotheses concerning conditional independence of the same variables in other marginal tables were accepted.

There seems however to be something wrong with the model shown in Figure 1 and it seems natural to ask how few and which interactions it is necessary to include in the model to correct these deficiencies.

The answer is, that it is indeed sufficient to consider one interaction, namely the one concerning the C and G variables.

Even if the hypotheses concerning the conditional independence of C and G were accepted, the inclusion of the CG interaction in the model, Figure 1, will automatically render the four rejected hypotheses invalid.

As this is the only interaction, the inclusion of which has these consequences, we proceed to accept the model with the CG interaction included, as the most parsimonious graphical model, which give a satisfactory description of the contingency table.

The model is shown in Figure 3. It has generating sets [ABE] [BDE] [BEF] [CG] [ACE] [BFG] and is characterized by the conditional independence of the following pairs of variables:

A & D : Stress and scatteredness
A & F : Stress and urbanisation
A & G : Stress and sex
B & C : Absence and overwhelmingness
C & D : Overwhelmingness and scatteredness
C & F : Overwhelmingness and urbanisation
D & F : Scatteredness and urbanisation
D & G : Scatteredness and sex
E & G : Problems and sex

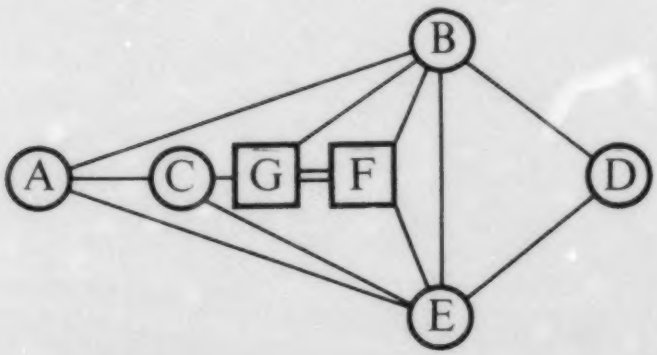


Fig.3. The interaction graph of the model given in figure 1, with the CG interaction included.
Response variables are represented by circles, the explanatory variables by squares and interaction fixed in the model by double edges.

## 5. Discussion

The computer programs developed for the conditional analysis of multiple contingency tables have been applied in several different contexts.

The present example was chosen among several alternatives with following two objectives in mind:

1) It should demonstrate the use of the conditional methods in a situation where the asymptotic methods might be expected to fail.

2) It should demonstrate the applicability of the methods for the analysis of a very large table and thereby demonstrate that the use of these methods is more than an interesting possibility.

The methods are - of course - not inexpensive and the price of computer resources is responsible for the limited number of tables - in most cases 500 - generated per test and thus also responsible for a relatively low precision of the approximation of the p-values. The point however is, that the inaccuracy of the p-values is quite transparent, and that it is up to the statistician alone to decide how precise the approximation should be (subject only to possible economic constraints). The same can't be said of the asymptotic p-values, which may be very inaccurate even in cases where the asymptotic approximations could reasonably be expected to be adequate (see for instance some of the cases of tests in 4-dimensional tables given in Table 3).

In addition the following conclusions may be drawn from the above analysis:

1) That the inclusion of the partial Goodman-Kruskal gamma greatly augments the power of the analysis, frequently disclosing interactions indetectable by the likelihood ratio or $\chi^2$ tests.

2) that the asymptotic p-values of the likelihood tests (almost) all are smaller than the asymptotic p-values of the $\chi^2$ test which again is smaller than the exact p-values. The use of the asymptotic p-values will thus typically always lead to the rejections of too many hypotheses.

3) a marked discrepancy between the asymptotic p-values of the likelihood ratio and $\chi^2$ tests, leading in many cases to markedly different results of the analysis. This discrepancy does not occur in connection with the exact p-values. An observed difference between p-values found from respectively likelihood ratio and $\chi^2$ tests calculated for the same hypotheses may in fact be taken as a warning that the asymptotic properties are invalid.

4) That the discrepancy between exact and asymptotic p-values disappears at a much quicker rate for the $\chi^2$ test than for the likelihood ratio test. Calculations of the improved

likelihood-ratio tests suggested by Willams (1976) in most cases remedy this problem but the improved p-values have in all cases been found to be greater than the exact p-values and in a few cases the improvement has led to p-values which were found to be more misleading than the originals.

The strategy suggested for the analysis necessarilly reflects the fact that the "exact" conditional tests are only available for the tests of zero partial association with the saturated model for the (possibly collapsed) contingency table as alternative. It follows that the tests performed in the second step of the analysis may not always be optimal (depending on which hypothesis were accepted in the first step). In principel exact conditional tests of any decomposable model with any more extensive decomposable model as alternative should be feasible, but until the programs for this more general situation has been developed, the test of zero partial association will have to do. The proposed strategy ensures, at least, a consistent and systematic analysis.

## Programs

Computer programs written in ALGOL for conditional analysis of contingency tables of dimension up to but not exceeding 7 and programs for the graph-theoretical analysis interaction graphs have been implimented at the Regional Computing Centre at the University of Copenhagen. Copies are available from the author. PASCAL and PLI versions of the programs are under preparation.

## Acknowledements.

The author wishes to thank David Edwards for helpful comments and Lone Aalekjaer for developing and testing the algorithms and programs for the graphical analysis.

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Appendix: the data fo· the example.

This Appendix contains the complete 7-dimer sional table analysed in the article all 2-dimensional marginal tables (as printed by the BMDP program).

```
@XQT
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TABLE 4. DISTRIBUTION OF TEACHERS ACCORDING TO SEX,
         URBANISATION, PROBLEMS,SCATTEREDNESS,
         OVERWHELMINGNESS, ABSENCE AND STRESS
                  ABSCENCE:    0    0    0  1-3  1-3  1-3 4-20 4-20 4-20
                    STRESS:  LOW MED. HIGH  LOW MED. HIGH  LOW MED. HIGH
 SEX URB. PRBL SCAT OVWH
-------------------------------------------------------------------------
MALE  LOW  LOW  LOW  LOW I    3    8         5   11         1
MALE  LOW  LOW  LOW HIGH I    1    3              3
MALE  LOW  LOW  LOW EDUC I
MALE  LOW  LOW  LOW SOC. I                       1
MALE  LOW  LOW MED.  LOW I         2         2    7
MALE  LOW  LOW MED. HIGH I    1    1         1    2
MALE  LOW  LOW MED. EDUC I
MALE  LOW  LOW MED. SOC. I
MALE  LOW  LOW HIGH  LOW I
MALE  LOW  LOW HIGH HIGH I
MALE  LOW  LOW HIGH EDUC I
MALE  LOW  LOW HIGH SOC. I
MALE  LOW MED.  LOW  LOW I    3   25         5   46    3         5    1
MALE  LOW MED.  LOW HIGH I    1   12    2    1   27    2         3
MALE  LOW MED.  LOW EDUC I         1              2    2         1
MALE  LOW MED.  LOW SOC. I
MALE  LOW MED. MED.  LOW I    3    4    1    3   21    1         2
MALE  LOW MED. MED. HIGH I         3    1         9    6         4
MALE  LOW MED. MED. EDUC I                       1
MALE  LOW MED. MED. SOC. I                       1
MALE  LOW MED. HIGH  LOW I                       1
MALE  LOW MED. HIGH HIGH I
MALE  LOW MED. HIGH EDUC I
MALE  LOW MED. HIGH SOC. I
MALE  LOW HIGH  LOW  LOW I         1              3    1         1
MALE  LOW HIGH  LOW HIGH I         3              2
MALE  LOW HIGH  LOW EDUC I
MALE  LOW HIGH  LOW SOC. I
MALE  LOW HIGH MED.  LOW I                       1
MALE  LOW HIGH MED. HIGH I         2              5              2
MALE  LOW HIGH MED. EDUC I
MALE  LOW HIGH MED. SOC. I         1              1
MALE  LOW HIGH HIGH  LOW I
MALE  LOW HIGH HIGH HIGH I         1
MALE  LOW HIGH HIGH EDUC I
MALE  LOW HIGH HIGH SOC. I
```

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TAB.4 CONT.:DISTRIBUTION OF TEACHERS ACCORDING TO SEX, URBANISATION, PROBLEMS,SCATTEREDNESS, OVERWHELMINGNESS, ABSENCE AND STRESS

| | | | | | ABSCENCE: | 0 | 0 | 0 | 1-3 | 1-3 | 1-3 | 4-20 | 4-20 | 4-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | STRESS: | LOW | MED. | HIGH | LOW | MED. | HIGH | LOW | MED. | HIGH |
| SEX | URB. | PRBL | SCAT | OVWH | | | | | | | | | | |
| MALE | MED. | LOW | LOW | LOW | I | 6 | 13 | | 10 | 20 | 1 | | 3 | |
| MALE | MED. | LOW | LOW | HIGH | I | | 4 | | 1 | 5 | 1 | | 1 | |
| MALE | MED. | LOW | LOW | EDUC | I | | 1 | | | | | | | |
| MALE | MED. | LOW | LOW | SOC. | I | | | | | 1 | | | 1 | |
| MALE | MED. | LOW | MED. | LOW | I | 1 | 4 | | 3 | 10 | | | 1 | |
| MALE | MED. | LOW | MED. | HIGH | I | 1 | | | | 4 | | | 1 | |
| MALE | MED. | LOW | MED. | EDUC | I | | 1 | | | | | | | |
| MALE | MED. | LOW | MED. | SOC. | I | | | | | | | | | |
| MALE | MED. | LOW | HIGH | LOW | I | | | | | | | | | |
| MALE | MED. | LOW | HIGH | HIGH | I | | | | | | | | | |
| MALE | MED. | LOW | HIGH | EDUC | I | | | | | | | | | |
| MALE | MED. | LOW | HIGH | SOC. | I | | | | | | | | | |
| MALE | MED. | MED. | LOW | LOW | I | 8 | 38 | | 16 | 100 | 8 | | 27 | 1 |
| MALE | MED. | MED. | LOW | HIGH | I | 1 | 24 | 1 | 4 | 78 | 8 | | 12 | 7 |
| MALE | MED. | MED. | LOW | EDUC | I | 1 | 1 | | | 3 | | | 1 | |
| MALE | MED. | MED. | LOW | SOC. | I | | 1 | | | 15 | | | | 1 |
| MALE | MED. | MED. | MED. | LOW | I | 2 | 16 | | 6 | 53 | 2 | | 18 | 2 |
| MALE | MED. | MED. | MED. | HIGH | I | 1 | 11 | | 2 | 57 | 6 | 1 | 22 | 3 |
| MALE | MED. | MED. | MED. | EDUC | I | | | | | 2 | | | 1 | |
| MALE | MED. | MED. | MED. | SOC. | I | | | | | 3 | 1 | | | |
| MALE | MED. | MED. | HIGH | LOW | I | | 2 | | | 7 | | | 3 | |
| MALE | MED. | MED. | HIGH | HIGH | I | | 2 | | | 4 | | | 2 | |
| MALE | MED. | MED. | HIGH | EDUC | I | | 1 | | | | | | | |
| MALE | MED. | MED. | HIGH | SOC. | I | | | | | | | | | |
| MALE | MED. | HIGH | LOW | LOW | I | | 5 | | 2 | 16 | | | 2 | |
| MALE | MED. | HIGH | LOW | HIGH | I | 1 | 4 | | | 18 | 2 | | 1 | 1 |
| MALE | MED. | HIGH | LOW | EDUC | I | | 1 | | | | | | | |
| MALE | MED. | HIGH | LOW | SOC. | I | | 1 | | | 1 | | | | |
| MALE | MED. | HIGH | MED. | LOW | I | | 4 | | 1 | 9 | 1 | | 2 | |
| MALE | MED. | HIGH | MED. | HIGH | I | | 5 | | | 22 | 2 | | 13 | 1 |
| MALE | MED. | HIGH | MED. | EDUC | I | | | | | 1 | | | | 1 |
| MALE | MED. | HIGH | MED. | SOC. | I | | | | | 1 | | | 1 | 1 |
| MALE | MED. | HIGH | HIGH | LOW | I | | 1 | | | 5 | | | | |
| MALE | MED. | HIGH | HIGH | HIGH | I | | | | 1 | 7 | 2 | | 2 | |
| MALE | MED. | HIGH | HIGH | EDUC | I | | | | | | | | | |
| MALE | MED. | HIGH | HIGH | SOC. | I | | | | | | | | | |

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TAB.4 CONT.:DISTRIBUTION OF TEACHERS ACCORDING TO SEX,
URBANISATION, PROBLEMS,SCATTEREDNESS,
OVERWHELMINGNESS, ABSENCE AND STRESS

| | | | | | | ABSCENCE: | 0 | 0 | 0 | 1-3 | 1-3 | 1-3 | 4-20 | 4-20 | 4-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | STRESS: | LOW | MED. | HIGH | LOW | MED. | HIGH | LOW | MED. | HIGH |
| SEX | URB. | PRBL | SCAT | OVWH | | | | | | | | | | | |
| MALE | HIGH | LOW | LOW | LOW | I | | 1 | 2 | | 3 | 6 | | | 2 | |
| MALE | HIGH | LOW | LOW | HIGH | I | | | 4 | | | 6 | | | | |
| MALE | HIGH | LOW | LOW | EDUC | I | | | | | | | | | | |
| MALE | HIGH | LOW | LOW | SOC. | I | | | | | | | | | | |
| MALE | HIGH | LOW | MED. | LOW | I | | | 1 | | 1 | 1 | | | | |
| MALE | HIGH | LOW | MED. | HIGH | I | | | | 1 | | | | | 1 | |
| MALE | HIGH | LOW | MED. | EDUC | I | | | | | | | | | | |
| MALE | HIGH | LOW | MED. | SOC. | I | | | | | | | | | | |
| MALE | HIGH | LOW | HIGH | LOW | I | | | | | | | | | | |
| MALE | HIGH | LOW | HIGH | HIGH | I | | | | | | | | | | |
| MALE | HIGH | LOW | HIGH | EDUC | I | | | | | | | | | | |
| MALE | HIGH | LOW | HIGH | SOC. | I | | | | | | | | | | |
| MALE | HIGH | MED. | LOW | LOW | I | | 2 | 14 | 1 | 5 | 39 | | | 5 | 2 |
| MALE | HIGH | MED. | LOW | HIGH | I | | | 10 | | 2 | 28 | | | 5 | 1 |
| MALE | HIGH | MED. | LOW | EDUC | I | | | | | | | | | | |
| MALE | HIGH | MED. | LOW | SOC. | I | | | 1 | 1 | | 1 | 1 | | | |
| MALE | HIGH | MED. | MED. | LOW | I | | 2 | 1 | | 3 | 23 | 3 | 1 | 4 | |
| MALE | HIGH | MED. | MED. | HIGH | I | | | 2 | | 1 | 13 | 2 | | 3 | 1 |
| MALE | HIGH | MED. | MED. | EDUC | I | | | | | | 1 | | | | |
| MALE | HIGH | MED. | MED. | SOC. | I | | | | | | 1 | 1 | | | |
| MALE | HIGH | MED. | HIGH | LOW | I | | | | | | 1 | | | | |
| MALE | HIGH | MED. | HIGH | HIGH | I | | 1 | | | | 1 | | | | |
| MALE | HIGH | MED. | HIGH | EDUC | I | | | | | | | | | | |
| MALE | HIGH | MED. | HIGH | SOC. | I | | | | | | | | | | |
| MALE | HIGH | HIGH | LOW | LOW | I | | 1 | 1 | | | 5 | | | 2 | 1 |
| MALE | HIGH | HIGH | LOW | HIGH | I | | | 1 | | 1 | 5 | 1 | | | |
| MALE | HIGH | HIGH | LOW | EDUC | I | | | | | | | | | 1 | |
| MALE | HIGH | HIGH | LOW | SOC. | I | | | | | | | | | | |
| MALE | HIGH | HIGH | MED. | LOW | I | | | 3 | | | 2 | | | 1 | |
| MALE | HIGH | HIGH | MED. | HIGH | I | | | 2 | | | 6 | 2 | | 1 | |
| MALE | HIGH | HIGH | MED. | EDUC | I | | | | | | | | | | |
| MALE | HIGH | HIGH | MED. | SOC. | I | | | | | | | | | | |
| MALE | HIGH | HIGH | HIGH | LOW | I | | | | | | 1 | | | 2 | |
| MALE | HIGH | HIGH | HIGH | HIGH | I | | | | | | | | | 1 | |
| MALE | HIGH | HIGH | HIGH | EDUC | I | | | | | | | | | | |
| MALE | HIGH | HIGH | HIGH | SOC. | I | | | | | | | | | | |

TAB.4 CONT.:DISTRIBUTION OF TEACHERS ACCORDING TO SEX, URBANISATION, PROBLEMS,SCATTEREDNESS, OVERWHELMINGNESS, ABSENCE AND STRESS

| | | | | | ABSCENCE: | 0 | 0 | 0 | 1-3 | 1-3 | 1-3 | 4-20 | 4-20 | 4-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | STRESS: | LOW | MED. | HIGH | LOW | MED. | HIGH | LOW | MED. | HIGH |
| SEX | URB. | PRBL | SCAT | OVWH | | | | | | | | | | |
| MALE | V.HG | LOW | LOW | LOW | I | | 1 | | 2 | 7 | 1 | | | |
| MALE | V.HG | LOW | LOW | HIGH | I | | 2 | | | 2 | | | | |
| MALE | V.HG | LOW | LOW | EDUC | I | | | | | | | | | |
| MALE | V.HG | LOW | LOW | SOC. | I | | | | | | | | | |
| MALE | V.HG | LOW | MED. | LOW | I | | | 1 | | | 1 | | 1 | |
| MALE | V.HG | LOW | MED. | HIGH | I | | | | | | 1 | | | |
| MALE | V.HG | LOW | MED. | EDUC | I | | | | | | | | | |
| MALE | V.HG | LOW | MED. | SOC. | I | | | | | | | | | |
| MALE | V.HG | LOW | HIGH | LOW | I | | | | | | | | | |
| MALE | V.HG | LOW | HIGH | HIGH | I | | | | | | | | | |
| MALE | V.HG | LOW | HIGH | EDUC | I | | | | | | | | | |
| MALE | V.HG | LOW | HIGH | SOC. | I | | | | | | | | | |
| MALE | V.HG | MED. | LOW | LOW | I | 1 | 4 | 1 | 1 | 12 | 1 | 1 | 5 | 2 |
| MALE | V.HG | MED. | LOW | HIGH | I | | 3 | | 3 | 13 | 3 | | 8 | 1 |
| MALE | V.HG | MED. | LOW | EDUC | I | | 2 | | | | | | | 1 |
| MALE | V.HG | MED. | LOW | SOC. | I | | | | | 4 | | | | |
| MALE | V.HG | MED. | MED. | LOW | I | 1 | 5 | | 1 | 9 | | | 5 | 1 |
| MALE | V.HG | MED. | MED. | HIGH | I | | 4 | | | 7 | 2 | | 5 | |
| MALE | V.HG | MED. | MED. | EDUC | I | | | | | 1 | | | | |
| MALE | V.HG | MED. | MED. | SOC. | I | | | | | | | | 2 | |
| MALE | V.HG | MED. | HIGH | LOW | I | | | | | | | | 1 | |
| MALE | V.HG | MED. | HIGH | HIGH | I | | 2 | | | 1 | | | 1 | |
| MALE | V.HG | MED. | HIGH | EDUC | I | | | | | | | | | |
| MALE | V.HG | MED. | HIGH | SOC. | I | | | | | | | | | |
| MALE | V.HG | HIGH | LOW | LOW | I | | 3 | | 1 | 2 | | | | |
| MALE | V.HG | HIGH | LOW | HIGH | I | 1 | | | | 9 | | | 3 | |
| MALE | V.HG | HIGH | LOW | EDUC | I | | | | | 1 | | | | |
| MALE | V.HG | HIGH | LOW | SOC. | I | | | | | 2 | | | | |
| MALE | V.HG | HIGH | MED. | LOW | I | | 1 | | | 3 | | | 1 | |
| MALE | V.HG | HIGH | MED. | HIGH | I | | | | | 5 | 1 | | 2 | 1 |
| MALE | V.HG | HIGH | MED. | EDUC | I | | | | | 1 | | | 1 | |
| MALE | V.HG | HIGH | MED. | SOC. | I | | | | | | | | | |
| MALE | V.HG | HIGH | HIGH | LOW | I | | 1 | | | 3 | | | | |
| MALE | V.HG | HIGH | HIGH | HIGH | I | | | | | 2 | | | 2 | 1 |
| MALE | V.HG | HIGH | HIGH | EDUC | I | | | | | | | | | |
| MALE | V.HG | HIGH | HIGH | SOC. | I | | | | | | | | | |

TAB.4 CONT.:DISTRIBUTION OF TEACHERS ACCORDING TO SEX,
URBANISATION, PROBLEMS,SCATTEREDNESS,
OVERWHELMINGNESS, ABSENCE AND STRESS

| | | | | | | ABSCENCE: | 0 | 0 | 0 | 1-3 | 1-3 | 1-3 | 4-20 | 4-20 | 4-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | STRESS: | LOW | MED. | HIGH | LOW | MED. | HIGH | LOW | MED. | HIGH |
| SEX | URB. | PRBL | SCAT | OVWH | | | | | | | | | | | |
| FEM. | LOW | LOW | LOW | LOW | I | | 3 | 6 | 1 | 2 | 7 | | | | |
| FEM. | LOW | LOW | LOW | HIGH | I | | | 3 | | | 3 | 2 | | | |
| FEM. | LOW | LOW | LOW | EDUC | I | | | 1 | | | | | | | |
| FEM. | LOW | LOW | LOW | SOC. | I | | | | | | | | | | 1 |
| FEM. | LOW | LOW | MED. | LOW | I | | | 4 | | 1 | 1 | | | | |
| FEM. | LOW | LOW | MED. | HIGH | I | | 3 | 2 | | | | | | | |
| FEM. | LOW | LOW | MED. | EDUC | I | | | | | | | | | | |
| FEM. | LOW | LOW | MED. | SOC. | I | | | | | | | | | | |
| FEM. | LOW | LOW | HIGH | LOW | I | | | | | | 1 | | | | |
| FEM. | LOW | LOW | HIGH | HIGH | I | | | | | | | | | | |
| FEM. | LOW | LOW | HIGH | EDUC | I | | | | | | | | | | |
| FEM. | LOW | LOW | HIGH | SOC. | I | | | | | | | | | | |
| FEM. | LOW | MED. | LOW | LOW | I | | 11 | 16 | 2 | 6 | 21 | 1 | | | |
| FEM. | LOW | MED. | LOW | HIGH | I | | 2 | 12 | | 2 | 19 | 2 | | | |
| FEM. | LOW | MED. | LOW | EDUC | I | | | | | | 2 | | | | |
| FEM. | LOW | MED. | LOW | SOC. | I | | | 1 | | | | | | | |
| FEM. | LOW | MED. | MED. | LOW | I | | 1 | 9 | | 2 | 14 | | | 1 | |
| FEM. | LOW | MED. | MED. | HIGH | I | | 1 | 9 | | | 13 | 2 | | | 1 |
| FEM. | LOW | MED. | MED. | EDUC | I | | | | | | | | | | |
| FEM. | LOW | MED. | MED. | SOC. | I | | | | | | | | | | |
| FEM. | LOW | MED. | HIGH | LOW | I | | | 1 | | 1 | | | | | |
| FEM. | LOW | MED. | HIGH | HIGH | I | | | 1 | | | 1 | | | | |
| FEM. | LOW | MED. | HIGH | EDUC | I | | | | | | 1 | | | | |
| FEM. | LOW | MED. | HIGH | SOC. | I | | | | | | | | | | |
| FEM. | LOW | HIGH | LOW | LOW | I | | | | | | 3 | | | 1 | |
| FEM. | LOW | HIGH | LOW | HIGH | I | | | 1 | | | 4 | 1 | | | |
| FEM. | LOW | HIGH | LOW | EDUC | I | | | | 1 | | | | | | |
| FEM. | LOW | HIGH | LOW | SOC. | I | | | | | | 1 | | | | |
| FEM. | LOW | HIGH | MED. | LOW | I | | 1 | 1 | | | 3 | 1 | | | |
| FEM. | LOW | HIGH | MED. | HIGH | I | | | 4 | | | 7 | 1 | | 1 | |
| FEM. | LOW | HIGH | MED. | EDUC | I | | 1 | | | | | | | | |
| FEM. | LOW | HIGH | MED. | SOC. | I | | | 1 | | | | | | | |
| FEM. | LOW | HIGH | HIGH | LOW | I | | | 1 | | | 1 | | | 1 | |
| FEM. | LOW | HIGH | HIGH | HIGH | I | | | | | | 3 | | | | |
| FEM. | LOW | HIGH | HIGH | EDUC | I | | | 1 | | | | | | | |
| FEM. | LOW | HIGH | HIGH | SOC. | I | | | | | | | | | | |

TAB.4 CONT.:DISTRIBUTION OF TEACHERS ACCORDING TO SEX, URBANISATION, PROBLEMS,SCATTEREDNESS, OVERWHELMINGNESS, ABSENCE AND STRESS

| | | | | | ABSCENCE: | 0 | 0 | 0 | 1-3 | 1-3 | 1-3 | 4-20 | 4-20 | 4-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | STRESS: | LOW | MED. | HIGH | LOW | MED. | HIGH | LOW | MED. | HIGH |
| SEX | URB. | PRBL | SCAT | OVWH | | | | | | | | | | |
| FEM. | MED. | LOW | LOW | LOW | I | 10 | 16 | 1 | 3 | 16 | 1 | | 2 | |
| FEM. | MED. | LOW | LOW | HIGH | I | 1 | 6 | | 1 | 2 | | | | |
| FEM. | MED. | LOW | LOW | EDUC | I | | | | | | | | | |
| FEM. | MED. | LOW | LOW | SOC. | I | | | | | 1 | | | | |
| FEM. | MED. | LOW | MED. | LOW | I | | 5 | | 3 | 5 | | | 1 | |
| FEM. | MED. | LOW | MED. | HIGH | I | 1 | 3 | | | | 1 | | | |
| FEM. | MED. | LOW | MED. | EDUC | I | | | | | | | | | |
| FEM. | MED. | LOW | MED. | SOC. | I | | | | | | | | | |
| FEM. | MED. | LOW | HIGH | LOW | I | | | | | | | | | |
| FEM. | MED. | LOW | HIGH | HIGH | I | | | | | | | | | |
| FEM. | MED. | LOW | HIGH | EDUC | I | | | | | | | | | |
| FEM. | MED. | LOW | HIGH | SOC. | I | | | | | | | | | |
| FEM. | MED. | MED. | LOW | LOW | I | 15 | 35 | 2 | 10 | 56 | 2 | | 11 | |
| FEM. | MED. | MED. | LOW | HIGH | I | 5 | 28 | 4 | 3 | 51 | 4 | | 6 | 2 |
| FEM. | MED. | MED. | LOW | EDUC | I | 1 | 1 | | | 1 | | | | |
| FEM. | MED. | MED. | LOW | SOC. | I | 3 | | | | 6 | | | | |
| FEM. | MED. | MED. | MED. | LOW | I | 5 | 14 | | 6 | 34 | 1 | | 3 | 2 |
| FEM. | MED. | MED. | MED. | HIGH | I | 2 | 9 | | 2 | 50 | 2 | | 7 | 3 |
| FEM. | MED. | MED. | MED. | EDUC | I | | | | | 1 | | | | |
| FEM. | MED. | MED. | MED. | SOC. | I | 1 | 2 | | 1 | 2 | | | | |
| FEM. | MED. | MED. | HIGH | LOW | I | | 4 | | | 1 | 2 | | 1 | |
| FEM. | MED. | MED. | HIGH | HIGH | I | | 2 | | | 6 | | | | |
| FEM. | MED. | MED. | HIGH | EDUC | I | | | | | | | | | |
| FEM. | MED. | MED. | HIGH | SOC. | I | | | | | | | | | |
| FEM. | MED. | HIGH | LOW | LOW | I | 1 | 4 | | | 5 | | | 2 | |
| FEM. | MED. | HIGH | LOW | HIGH | I | | 7 | | | 8 | | | 4 | 1 |
| FEM. | MED. | HIGH | LOW | EDUC | I | | | | | | 1 | | | |
| FEM. | MED. | HIGH | LOW | SOC. | I | | | | 1 | 1 | | | | |
| FEM. | MED. | HIGH | MED. | LOW | I | | 4 | 1 | 1 | 10 | 1 | | 4 | |
| FEM. | MED. | HIGH | MED. | HIGH | I | 1 | 10 | 1 | | 17 | 3 | | 11 | 3 |
| FEM. | MED. | HIGH | MED. | EDUC | I | | | | | | | | | |
| FEM. | MED. | HIGH | MED. | SOC. | I | | | | | 1 | | | | |
| FEM. | MED. | HIGH | HIGH | LOW | I | | 2 | | | 2 | | | | 2 |
| FEM. | MED. | HIGH | HIGH | HIGH | I | | | | | 10 | | | 3 | |
| FEM. | MED. | HIGH | HIGH | EDUC | I | | | | | | | | | |
| FEM. | MED. | HIGH | HIGH | SOC. | I | | | | | | | | | |

TAB.4 CONT.:DISTRIBUTION OF TEACHERS ACCORDING TO SEX, URBANISATION, PROBLEMS,SCATTEREDNESS, OVERWHELMINGNESS, ABSENCE AND STRESS

| | | | | | ABSCENCE: | 0 | 0 | 0 | 1-3 | 1-3 | 1-3 | 4-20 | 4-20 | 4-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | STRESS: | LOW | MED. | HIGH | LOW | MED. | HIGH | LOW | MED. | HIGH |
| SEX | URB. | PRBL | SCAT | OVWH | | | | | | | | | | |
| FEM. | HIGH | LOW | LOW | LOW | I | 2 | 5 | | 4 | 7 | | | | |
| FEM. | HIGH | LOW | LOW | HIGH | I | | 1 | | | 2 | 1 | | | |
| FEM. | HIGH | LOW | LOW | EDUC | I | | | | | | | | | |
| FEM. | HIGH | LOW | LOW | SOC. | I | | | | | | | | | |
| FEM. | HIGH | LOW | MED. | LOW | I | | 1 | | | 2 | | | | |
| FEM. | HIGH | LOW | MED. | HIGH | I | | | | | | | 1 | | |
| FEM. | HIGH | LOW | MED. | EDUC | I | | | | | | | | | |
| FEM. | HIGH | LOW | MED. | SOC. | I | | | | | | | | | |
| FEM. | HIGH | LOW | HIGH | LOW | I | | | | | | | | | |
| FEM. | HIGH | LOW | HIGH | HIGH | I | | | | | | | | | |
| FEM. | HIGH | LOW | HIGH | EDUC | I | | | | | | | | | |
| FEM. | HIGH | LOW | HIGH | SOC. | I | | | | | | | | | |
| FEM. | HIGH | MED. | LOW | LOW | I | 3 | 13 | | 9 | 22 | 1 | | 2 | |
| FEM. | HIGH | MED. | LOW | HIGH | I | 1 | 11 | | 2 | 12 | 1 | | 1 | 1 |
| FEM. | HIGH | MED. | LOW | EDUC | I | | | | | | | | | |
| FEM. | HIGH | MED. | LOW | SOC. | I | | 1 | | | 2 | | | | |
| FEM. | HIGH | MED. | MED. | LOW | I | 3 | 6 | | | 13 | | | 1 | 2 |
| FEM. | HIGH | MED. | MED. | HIGH | I | | 2 | | 3 | 15 | 2 | | 4 | 2 |
| FEM. | HIGH | MED. | MED. | EDUC | I | | | | | | | | | |
| FEM. | HIGH | MED. | MED. | SOC. | I | | | | | | | | | |
| FEM. | HIGH | MED. | HIGH | LOW | I | 1 | 1 | | | 1 | | | | |
| FEM. | HIGH | MED. | HIGH | HIGH | I | | | | | 2 | | | | |
| FEM. | HIGH | MED. | HIGH | EDUC | I | | | | | | | | | |
| FEM. | HIGH | MED. | HIGH | SOC. | I | | | | | | | | | |
| FEM. | HIGH | HIGH | LOW | LOW | I | | 1 | | | 8 | 1 | | | 1 |
| FEM. | HIGH | HIGH | LOW | HIGH | I | 1 | | | | 4 | | | | |
| FEM. | HIGH | HIGH | LOW | EDUC | I | | | | | | | | | |
| FEM. | HIGH | HIGH | LOW | SOC. | I | | | | | 1 | | | | |
| FEM. | HIGH | HIGH | MED. | LOW | I | | 2 | | | 5 | | | 1 | |
| FEM. | HIGH | HIGH | MED. | HIGH | I | | 3 | | | 6 | 1 | | 2 | |
| FEM. | HIGH | HIGH | MED. | EDUC | I | | 1 | | | | | | | |
| FEM. | HIGH | HIGH | MED. | SOC. | I | | | | | | | | | |
| FEM. | HIGH | HIGH | HIGH | LOW | I | | | | | | | | | |
| FEM. | HIGH | HIGH | HIGH | HIGH | I | | 1 | | | 4 | | | 1 | |
| FEM. | HIGH | HIGH | HIGH | EDUC | I | | | | | | | | | |
| FEM. | HIGH | HIGH | HIGH | SOC. | I | | | | | | | | | |

TAB.4 CONT.:DISTRIBUTION OF TEACHERS ACCORDING TO SEX,
URBANISATION, PROBLEMS,SCATTEREDNESS,
OVERWHELMINGNESS, ABSENCE AND STRESS

| | | | | | ABSCENCE: | 0 | 0 | 0 | 1-3 | 1-3 | 1-3 | 4-20 | 4-20 | 4-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | STRESS: | LOW | MED. | HIGH | LOW | MED. | HIGH | LOW | MED. | HIGH |
| SEX | URB. | PRBL | SCAT | OVWH | | | | | | | | | | |
| FEM. | V.HG | LOW | LOW | LOW | I | 2 | 4 | | 1 | 5 | | | | |
| FEM. | V.HG | LOW | LOW | HIGH | I | | 1 | | | | | | | |
| FEM. | V.HG | LOW | LOW | EDUC | I | | 1 | | | | | | | |
| FEM. | V.HG | LOW | LOW | SOC. | I | | | | | | | | | |
| FEM. | V.HG | LOW | MED. | LOW | I | | | | 1 | 2 | | | | |
| FEM. | V.HG | LOW | MED. | HIGH | I | | | | | 1 | | | | |
| FEM. | V.HG | LOW | MED. | EDUC | I | | | | | | | | | |
| FEM. | V.HG | LOW | MED. | SOC. | I | | | | | | | | | |
| FEM. | V.HG | LOW | HIGH | LOW | I | | | | | 1 | | | | |
| FEM. | V.HG | LOW | HIGH | HIGH | I | | | | | | | | | |
| FEM. | V.HG | LOW | HIGH | EDUC | I | | | | | | | | | |
| FEM. | V.HG | LOW | HIGH | SOC. | I | | | | | | | | | |
| FEM. | V.HG | MED. | LOW | LOW | I | 1 | 6 | | 1 | 13 | 2 | 1 | 1 | |
| FEM. | V.HG | MED. | LOW | HIGH | I | 1 | 6 | 1 | 3 | 18 | | | 4 | 1 |
| FEM. | V.HG | MED. | LOW | EDUC | I | | | | 1 | | | | | |
| FEM. | V.HG | MED. | LOW | SOC. | I | | 1 | | | | | | | |
| FEM. | V.HG | MED. | MED. | LOW | I | 2 | 4 | | 2 | 6 | 1 | | 1 | |
| FEM. | V.HG | MED. | MED. | HIGH | I | | 4 | 1 | 2 | 6 | 1 | | 5 | |
| FEM. | V.HG | MED. | MED. | EDUC | I | | | | | | | | | |
| FEM. | V.HG | MED. | MED. | SOC. | I | | | | | | | | | |
| FEM. | V.HG | MED. | HIGH | LOW | I | | | | | 1 | | | | |
| FEM. | V.HG | MED. | HIGH | HIGH | I | | | | | | | | 1 | |
| FEM. | V.HG | MED. | HIGH | EDUC | I | | | | | 1 | 1 | | | |
| FEM. | V.HG | MED. | HIGH | SOC. | I | | | | | | | | | |
| FEM. | V.HG | HIGH | LOW | LOW | I | | 2 | | 1 | 2 | | | 2 | |
| FEM. | V.HG | HIGH | LOW | HIGH | I | | 3 | | | 4 | | | 2 | 1 |
| FEM. | V.HG | HIGH | LOW | EDUC | I | | | | | 1 | | | | |
| FEM. | V.HG | HIGH | LOW | SOC. | I | | 1 | | | | | | | |
| FEM. | V.HG | HIGH | MED. | LOW | I | | 1 | | | 2 | | | 1 | |
| FEM. | V.HG | HIGH | MED. | HIGH | I | 1 | 1 | | | 10 | 1 | | 2 | |
| FEM. | V.HG | HIGH | MED. | EDUC | I | | | | | | | | | |
| FEM. | V.HG | HIGH | MED. | SOC. | I | | | | | | | | | |
| FEM. | V.HG | HIGH | HIGH | LOW | I | | | | | | | | | |
| FEM. | V.HG | HIGH | HIGH | HIGH | I | | 1 | | | 1 | | | 3 | |
| FEM. | V.HG | HIGH | HIGH | EDUC | I | | | | | | | | | |
| FEM. | V.HG | HIGH | HIGH | SOC. | I | | | | | | | | | 1 |

EXECUTION TIME 0.478 SECONDS
@BRKPT PRINT$

| ABSENCE | STRESS | | | |
|---|---|---|---|---|
| | LOW | MEDIUM | HIGH | TOTAL |
| 0 | 131 | 588 | 25 | 744 |
| 1-3 | 162 | 1381 | 110 | 1653 |
| 4-20 | 6 | 290 | 55 | 351 |
| TOTAL | 299 | 2259 | 190 | 2748 |

| OVERWHLM | STRESS | | | |
|---|---|---|---|---|
| | LOW | MEDIUM | HIGH | TOTAL |
| LOW | 223 | 1151 | 65 I | 1439 |
| HIGH | 66 | 1008 | 110 I | 1184 |
| EDUCAT. | 4 | 38 | 7 I | 49 |
| SOCIAL | 6 | 62 | 8 I | 76 |
| TOTAL | 299 | 2259 | 190 I | 2748 |

| SCATTER. | STRESS | | | |
|---|---|---|---|---|
| | LOW | MEDIUM | HIGH | TOTAL |
| LOW | 209 | 1317 | 100 I | 1626 |
| MEDIUM | 86 | 823 | 81 I | 990 |
| HIGH | 4 | 119 | 9 I | 132 |
| TOTAL | 299 | 2259 | 190 I | 2748 |

| PROBLEMS | STRESS | | | |
|---|---|---|---|---|
| | LOW | MEDIUM | HIGH | TOTAL |
| LOW | 82 | 262 | 15 I | 359 |
| MEDIUM | 199 | 1558 | 133 I | 1890 |
| HIGH | 18 | 439 | 42 I | 499 |
| TOTAL | 299 | 2259 | 190 I | 2748 |

| URBANIS. | STRESS | | | |
|---|---|---|---|---|
| | LOW | MEDIUM | HIGH | TOTAL |
| LOW | 67 | 412 | 36 I | 515 |
| MEDIUM | 146 | 1189 | 93 I | 1428 |
| HIGH | 54 | 377 | 31 I | 462 |
| VERY HIG | 32 | 281 | 30 I | 343 |
| TOTAL | 299 | 2259 | 190 I | 2748 |

| SEX | STRESS | | | |
|---|---|---|---|---|
| | LOW | MEDIUM | HIGH | TOTAL |
| FEMALE | 135 | 1284 | 110 I | 1529 |
| MALE | 164 | 975 | 80 I | 1219 |
| TOTAL | 299 | 2259 | 190 I | 2748 |

| OVERWHLM | ABSENCE | | | |
|---|---|---|---|---|
| | 0 | 1-3 | 4-20 | TOTAL |
| LOW | 434 | 855 | 150 | 1439 |
| HIGH | 277 | 721 | 186 | 1184 |
| EDUCAT. | 17 | 25 | 7 | 49 |
| SOCIAL | 16 | 52 | 8 | 76 |
| TOTAL | 744 | 1653 | 351 | 2748 |

| SCATTER. | ABSENCE | | | |
|---|---|---|---|---|
| | 0 | 1-3 | 4-20 | TOTAL |
| LOW | 500 | 969 | 157 | 1626 |
| MEDIUM | 217 | 607 | 166 | 990 |
| HIGH | 27 | 77 | 28 | 132 |
| TOTAL | 744 | 1653 | 351 | 2748 |

| PROBLEMS | ABSENCE | | | |
|---|---|---|---|---|
| | 0 | 1-3 | 4-20 | TOTAL |
| LOW | 146 | 196 | 17 | 359 |
| MEDIUM | 492 | 1162 | 236 | 1890 |
| HIGH | 106 | 295 | 98 | 499 |
| TOTAL | 744 | 1653 | 351 | 2748 |

| URBANIS. | ABSENCE | | | |
|---|---|---|---|---|
| | 0 | 1-3 | 4-20 | TOTAL |
| LOW | 184 | 305 | 26 | 515 |
| MEDIUM | 370 | 857 | 201 | 1428 |
| HIGH | 112 | 297 | 53 | 462 |
| VERY HIG | 78 | 194 | 71 | 343 |
| TOTAL | 744 | 1653 | 351 | 2748 |

| SEX | ABSENCE | | | |
|---|---|---|---|---|
| | 0 | 1-3 | 4-20 | TOTAL |
| FEMALE | 331 | 966 | 232 | 1529 |
| MALE | 413 | 687 | 119 | 1219 |
| TOTAL | 744 | 1653 | 351 | 2748 |

| SCATTER. | OVERWHLM | | | | |
|---|---|---|---|---|---|
| | LOW | HIGH | EDUCAT. | SOCIAL | TOTAL |
| LOW | 930 | 613 | 30 | 53 I | 1626 |
| MEDIUM | 456 | 498 | 14 | 22 I | 990 |
| HIGH | 53 | 73 | 5 | 1 I | 132 |
| TOTAL | 1439 | 1184 | 49 | 76 I | 2748 |

| PROBLEMS | OVERWHLM | | | | |
|---|---|---|---|---|---|
| | LOW | HIGH | EDUCAT. | SOCIAL | TOTAL |
| LOW | 268 | 82 | 4 | 5 I | 359 |
| MEDIUM | 1000 | 804 | 32 | 54 I | 1890 |
| HIGH | 171 | 298 | 13 | 17 I | 499 |
| TOTAL | 1439 | 1184 | 49 | 76 I | 2748 |

| URBANIS. | OVERWHLM | | | | |
|---|---|---|---|---|---|
| | LOW | HIGH | EDUCAT. | SOCIAL | TOTAL |
| LOW | 295 | 198 | 14 | 8 I | 515 |
| MEDIUM | 735 | 626 | 20 | 47 I | 1428 |
| HIGH | 260 | 189 | 3 | 10 I | 462 |
| VERY HIG | 149 | 171 | 12 | 11 I | 343 |
| TOTAL | 1439 | 1184 | 49 | 76 I | 2748 |

| SEX | OVERWHLM | | | | |
|---|---|---|---|---|---|
| | LOW | HIGH | EDUCAT. | SOCIAL | TOTAL |
| FEMALE | 821 | 631 | 31 | 46 I | 1529 |
| MALE | 618 | 553 | 18 | 30 I | 1219 |
| TOTAL | 1439 | 1184 | 49 | 76 I | 2748 |

| PROBLEMS | SCATTER. | | | |
|---|---|---|---|---|
| | LOW | MEDIUM | HIGH | TOTAL |
| LOW | 268 | 89 | 2 I | 359 |
| MEDIUM | 1168 | 662 | 60 I | 1890 |
| HIGH | 190 | 239 | 70 I | 499 |
| TOTAL | 1626 | 990 | 132 I | 2748 |

URBANIS. SCATTER.

| | LOW | MEDIUM | HIGH | TOTAL |
|---|---|---|---|---|
| LOW | 327 | 173 | 15 I | 515 |
| MEDIUM | 820 | 534 | 74 I | 1428 |
| HIGH | 282 | 162 | 18 I | 462 |
| VERY HIG | 197 | 121 | 25 I | 343 |
| TOTAL | 1626 | 990 | 132 I | 2748 |

SEX SCATTER.

| | LOW | MEDIUM | HIGH | TOTAL |
|---|---|---|---|---|
| FEMALE | 932 | 535 | 62 I | 1529 |
| MALE | 694 | 455 | 70 I | 1219 |
| TOTAL | 1626 | 990 | 132 I | 2748 |

URBANIS. PROBLEMS

| | LOW | MEDIUM | HIGH | TOTAL |
|---|---|---|---|---|
| LOW | 93 | 358 | 64 I | 515 |
| MEDIUM | 173 | 995 | 260 I | 1428 |
| HIGH | 55 | 323 | 84 I | 462 |
| VERY HIG | 38 | 214 | 91 I | 343 |
| TOTAL | 359 | 1890 | 499 I | 2748 |

SEX PROBLEMS

| | LOW | MEDIUM | HIGH | TOTAL |
|---|---|---|---|---|
| FEMALE | 194 | 1086 | 249 I | 1529 |
| MALE | 165 | 804 | 250 I | 1219 |
| TOTAL | 359 | 1890 | 499 I | 2748 |

SEX URBANIS.

| | LOW | MEDIUM | HIGH | VERY HIG | TOTAL |
|---|---|---|---|---|---|
| FEMALE | 279 | 818 | 252 | 180 I | 1529 |
| MALE | 236 | 610 | 210 | 163 I | 1219 |
| TOTAL | 515 | 1428 | 462 | 343 I | 2748 |

The Danish Institute
for Educational
Research

28 Hermodsgade
DK 2200
Copenhagen N
Denmark

Phone
Internat.:
+ 45 1 81 01 40

The Danish Institute for Educational Research is engaged in educational research, educational development and informative work in education. Studies can be related to all age-groups - from pre-school to retirement.

The Danish Institute for Educational Research was established in 1955 and is directly responsible to the Ministry of Education. It is closely concerned with all aspects of educational activity and co-operates with other scientific institutes and individuals to an extent determined by the projects and studies.

**The objects** of the Institute are as follows:
a. to carry out scientific research and studies of importance to educational activities.
b. to assist in developmental projects for which scientific support is required and to offer advisory service, planning, collection and analysis of educational material.
c. to provide students of psychology and education with trainee facilities at the Institute.
d. to publish reports of its activities and provide information in general, relating to matters of interest in the field of education.
e. to construct and distribute tests and similar material which by their nature cannot be made freely available.

The management of the Institute consists of **the Director** who conducts the daily administrative and scientific work, and **the Research Board** composed of the Director, **the Research Directors** of the Departments of the Institute, and the following members appointed by the Minister of Education: 12 researchers (professors, etc.) within pedagogies, psychology, educational sociology, and educational economics, etc., and one member of the Institute's Council of Representatives, nominated by the Council.

The Research Board is the highest authority of the Institute in all scientific matters. It is the duty of the Research Board to approve the Institute's research programme, to follow developments in educational and psychological research, and to initiate research projects. The Research Board holds 10 annual meetings.

The Institute has a **Council of Representatives**, composed of representatives of educational organisations, other professional associations and institutions within the Institute's field of activities. The Council of Representatives serves as a contact between the Institute and the various fields of education. The Council is entitled to discuss all matters concerning the Institute and to make recommendations to the management of the Institute. It usually meets once a year.

At the Institute the following **departments, etc.** have been established:
Dept. 1. Department for research in educational planning and action
Section for differential pedagogics
Dept. 2. Department for basic research in educational psychology
Dept. 3. Department for tests
Dept. 4. Department of educational experiments
Dept. 5. Department for statistics (with computer terminal)
Laboratory (ITV etc.)
Administration and sales office.

**Publication of work on research and development, etc.**
A list of the publications is given in the **annual lists of publications** (in Danish).

Moreover, an annual **report** is published which also contains the research programme of the Institute.

A description of the Institute is given in »Danmarks pædagogiske Institut. Beretning 1977-78. Anden del. En undersøgelse af Danmarks pædagogiske Instituts funktion« (An analysis of the function of the Institute).

**Current information** on i.a. projects and new publications is given in »NYT fra Danmarks pædagogiske Institut« which is published regularly in Danish.

**Information and advisory service** are offered through the staff's membership of boards, councils, commissions and committees, work groups, etc. in the field of education, and in addition the Institute assists in the working up of material, answers enquiries and assists with advice in the field of educational development.

The Institute was established under the Act of 11th June, 1954, and the rules governing the Institute have been laid down in the Executive Orders of 2nd March, 1965 and 2nd August, 1982.

Vend venligst.

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Danmarks
Pædagogiske
Institut

Hermodsgade 28
2200 København N
Tlf. (01) 81 01 40

Danmarks pædagogiske Institut arbejder med forsknings- og udviklingsarbejde inden for opdragelse og uddannelse. Arbejdet kan foregå inden for alle livsaldre fra førskolealderen til pensionistalderen.

Danmarks pædagogiske Institut er oprettet i 1955. Det hører direkte under undervisningsministeriet med nøje samarbejde til alle sider af pædagogisk virksomhed. Det samarbejder med andre videnskabelige institutter og enkeltpersoner i det omfang, de enkelte arbejder og undersøgelser forudsætter.

Instituttet har følgende **formål:**

a. At foretage undersøgelser og udføre arbejder af betydning for pædagogisk virksomhed.
b. At assistere i pædagogisk forsøgsvirksomhed, hvortil videnskabelig støtte ønskes, og at være behjælpelig med rådgivning, planlægning og indsamling og bearbejdelse af materialer.
c. At give psykologi- og pædagogikstuderende adgang til praktiktjeneste ved instituttet.
d. Gennem publikationer at gøre rede for resultaterne af sit arbejde og i øvrigt at sørge for orientering om forhold af væsentlig betydning for pædagogisk virksomhed.
e. At udarbejde og forestå udsendelse af testmateriale o.lign., som på grund af sin beskaffenhed ikke kan være frit tilgængeligt.

Instituttets **ledelse** består af direktøren, der har den daglige administrative og faglige ledelse, og af et fagligt råd bestående af direktøren, lederne af instituttets afdelinger og følgende af undervisningsministeren beskikkede medlemmer: 12 forskere indenfor pædagogik, psykologi, uddannelsessociologi og -økonomi m.v. og 1 medlem af instituttets repræsentantskab efter indstilling fra repræsentantskabet.

Det faglige Råd er instituttets højeste myndighed i alle videnskabelige spørgsmål. Det påhviler rådet at godkende instituttets arbejdsplan, at følge udviklingen inden for det pædagogiske og det pædagogisk-psykologiske forskningsområde og at tage initiativ til gennemførelse af forskningsopgaver. Rådet holder normalt 10 møder om året.

Til instituttet er knyttet et **repræsentantskab** sammensat af repræsentanter for pædagogiske organisationer, andre faglige foreninger og institutioner inden for instituttets arbejdsområder. Repræsentantskabet formidler kontakt mellem instituttet og de pædagogiske arbejdsområder. Det kan drøfte alle spørgsmål vedrørende instituttet og gøre indstilling herom til instituttets ledelse. Det holder normalt møde én gang årligt.

Ved instituttet er oprettet følgende **afdelinger m.v.:**
Afdeling 1. Afdelingen for didaktiske undersøgelser
Sektion for differentiel pædagogik
Afdeling 2. Afdelingen for pædagogisk-psykologisk grundforskning
Afdeling 3. Afdelingen for tests og prøver
Afdeling 4. Afdelingen for pædagogisk forsøgsvirksomhed
Afdeling 5. Afdelingen for statistik (herunder edb-terminal)
Laboratorium (ITV m.m.)
Administrations- og salgsafdeling

**Formidling af forsknings- og udviklingsarbejde m.v.**
Instituttet udgiver publikationer om foretagne forsknings- og udviklingsarbejder m.v.

En fortegnelse over dem findes i de **årlige publikationsoversigter.**

Desuden udgives der hvert år en **beretning,** som også indeholder instituttets arbejdsplan.

En beskrivelse af instituttet findes i »Danmarks pædagogiske Institut. Beretning 1977-78. Anden del. En undersøgelse af Danmarks pædagogiske Instituts funktion«.

**Løbende orientering** om bl.a. arbejder og nye publikationer gives i »NYT fra Danmarks pædagogiske Institut«, der udsendes gratis.

**Oplysende og rådgivende virksomhed** udføres gennem institutmedarbejdernes medlemskab af råd, nævn, kommissioner, udvalg og arbejdsgrupper m.v. inden for opdragelses- og uddannelsesområderne. Hertil kommer assistance ved bearbejdelse af materialer, ved besvarelse af forespørgsler og ved rådgivende assistance til pædagogisk udviklingsarbejde.

Instituttet er oprettet i henhold til lov af 11. juni 1954, og reglerne for instituttet er fastsat ved bekendtgørelser af 2. marts 1965 og 2. august 1982.

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# PUBLIKATIONSLISTER FOR DANMARKS PÆDAGOGISKE INSTITUT

## Publikationslister for 1955-83

findes i

Danmarks pædagogiske Institut 1955-75.
København, 1975, side 23-59.
NYT FRA DANMARKS PÆDAGOGISKE INSTITUT,
1975, nr. 6
1976, nr. 21
1977, nr. 38
1978, nr. 45
1979, nr. 52
1980, nr. 60
1981, nr. 66
1982, nr. 76
1983, nr. 88

## Publikationsliste for 1984

Publikationerne nummereres med årstal først og dernæst nummer i kalenderåret.

I en række tilfælde yder institutmedarbejdere tekstbidrag og redaktionsarbejde til betænkninger, udredninger, rapporter, vejledninger m.v. i samarbejde med personer fra andre institutioner. Sådanne publikationer er markeret med betegnelsen Tekstbidrag.

Publikationer mærket Inst. er i reglen duplikerede. De kan købes ved bestilling direkte til instituttet eller skaffes gennem boghandelen.

Publikationer mærket Bogh. kan ikke købes på instituttet, men kan anskaffes i boghandelen.

De med T mærkede publikationer er for største delens vedkommende tidsskriftsartikler, som kan lånes på bibliotekerne.

1984.01 Svend Kreiner: Analysis of multiple contingency tables by exact conditional tests for zero partial association. København: Danmarks pædagogiske Institut, 1984. (Inst.)

Oplysninger om instituttet og dets øvrige publikationer kan fås ved henvendelse til:

Danmarks Pædagogiske Institut
Herrmodsgade 28, DK 2200 København N, Tlf. (01) 810140